

United States Patent [19]

[11] Patent Number: 4,759,749

[45] Date of Patent: Jul. 26, 1988

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| [54] HEATER FOR PHYSIOLOGICAL FLUIDS | 4,437,513 | 3/1984 | Castiglioni et al. | 165/154 |
| [75] Inventor: Wesley H. Verkaart, Dubury, Mass. | 4,475,584 | 10/1984 | Martin et al. | 165/154 |
| [73] Assignee: Level 1 Technologies, Inc., Plymouth, Mass. | 4,559,999 | 12/1985 | Servas et al. | 165/156 |
| [21] Appl. No.: 866,910 | 4,562,890 | 1/1986 | Matoba | 165/156 |
| [22] Filed: May 27, 1986 | 4,623,333 | 11/1986 | Fried | 604/113 |
| [51] Int. Cl. ⁴ | 4,678,460 | 7/1987 | Rosner | 604/80 |
| [52] U.S. Cl. | | | | |
| 165/67; 165/156; 422/46 | | | | |
| [58] Field of Search | 604/113; 128/399-401, DIG. 3; | | | |
| 604/80, 82, 259, 322, 128/399-401, DIG. 3; | 165/154, 156, 67, 68; 285/345, 231; 422/46 | | | |
| [56] References Cited | | | | |
| U.S. PATENT DOCUMENTS | | | | |
| 1,873,590 8/1932 James | 285/445 | | | |
| 2,432,592 12/1948 Stecher et al. | 285/231 | | | |
| 3,004,119 11/1951 Lichten et al. | 604/114 | | | |
| 3,064,649 12/1958 Fournier | 128/400 | | | |
| 3,374,066 3/1968 Farrant | 604/113 | | | |
| 3,643,273 2/1970 Hall et al. | 165/154 | | | |
| 3,831,672 8/1974 Battisti | 165/156 | | | |
| 4,066,119 1/1978 Stedman | 165/67 | | | |

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ABSTRACT

A self-contained portable unit for heating physiological fluids is disclosed. A heat exchanger is disposable to ensure sterility, and the heat exchanger is attached to a heating system by inserting it between opposed fluid connection elements. One of the fluid connection elements is movable to permit the heat exchanger to be installed and removed easily by inserting one end of the heat exchanger in one of the fluid connection units and moving the other fluid connection unit into contact with an opposite end of the heat exchanger. The heating fluid is heated by an electric heating element and is circulated by an electric pump.

19 Claims, 5 Drawing Sheets